CLAIMS

The invention claimed is:

1. An albumin-free medium that supports proliferation of pluripotent stem cells.

2. The medium of Claim 1, wherein the medium comprises:

water, salts, amino acids, vitamins, a carbon source, insulin, an FGF, selenium, transferrin, and one of TGF-β and NODAL, each in an amount sufficient to support pluripotent stem cell proliferation.

3. A method for culturing pluripotent stem cells, the method comprising the steps of:

placing pluripotent stem cells on a matrix; and

contacting the cells with an albumin-free medium that supports pluripotent stem cell proliferation.

4. The method of Claim 3, wherein the medium comprises:

water, salts, amino acids, vitamins, a carbon source, insulin, an FGF, selenium, transferrin, and one of TGF-β and NODAL, each in an amount sufficient to support pluripotent stem cell proliferation.

5. The method of Claim 3, wherein the matrix comprises laminin.

6. The method of Claim 3, wherein the matrix comprises vitronectin.

7. The method of Claim 3, wherein the cells are contacted with the medium under hypoxic conditions.

8. The method of Claim 3, wherein the pluripotent stem cells are embryonic stem cells.

9. The method of Claim 3, wherein the pluripotent stem cells are induced pluripotent stem cells.

10. The method of Claim 3, wherein the pluripotent stem cells are human cells.

11. A method for cloning a pluripotent stem cell, the method comprising the step of:

plating pluripotent stem cells at cloning density in an albumin-free medium that supports pluripotent stem cell cloning.

12. The method of Claim 11, wherein the medium comprises:

water, salts, amino acids, vitamins, a carbon source, insulin, an FGF, selenium, transferrin, and one of TGF-β and NODAL, each in an amount sufficient to support pluripotent stem cell cloning.

13. The method of Claim 11, wherein the medium further comprises a ROCK inhibitor.

14. The method of Claim 13, wherein the ROCK inhibitor is selected from the group consisting of HA100 and Y27632.

15. The method of Claim 11, wherein the medium further comprises blebbistatin.

16. A method of cryopreserving pluripotent stem cells, the method comprising the step of:

freezing pluripotent stem cells in an albumin-free medium.

17. The method of Claim 16, wherein the medium comprises:

water, salts, amino acids, vitamins, a carbon source, insulin, an FGF, selenium, transferrin, and one of TGF-β and NODAL, each in an amount sufficient to support pluripotent stem cell proliferation.

18. A method for deriving an induced pluripotent stem (iPS) cell under defined conditions, the method comprising the step of:

reprogramming a somatic cell in an albumin-free medium that supports somatic cell reprogramming to derive an iPS cell.

19. The method of Claim 18, wherein the medium comprises:

water, salts, amino acids, vitamins, a carbon source, insulin, an FGF, selenium, transferrin, and one of TGF-β and NODAL, each in an amount sufficient to support iPS cell derivation.

20. The method of Claim 18, wherein the reprogramming step comprises contacting the cell with TGF-β for 5-10 days.

21. The method of Claim 20, further comprising the steps of:

removing the TGF-β after 5-10 days; and

contacting the cells with a medium consisting essentially of:

water, salts, amino acids, vitamins, a carbon source, insulin, an FGF, selenium, and transferrin.

22. The method of Claim 18, wherein the reprogramming step comprises contacting the cell with hydrocortisone.

23. The method of Claim 18, wherein the reprogramming step comprises contacting the cell with butyrate.

24. The method of Claim 18, wherein the iPS cell is derived under xeno-free conditions.

25. The method of Claim 18, wherein the somatic cell is an adult somatic cell.

26. The method of Claim 18, wherein the reprogramming step comprises using a viral vector.

27. The method of Claim 18, wherein the reprogramming step comprises using an episomal vector.

28. An albumin-free growth medium that supports long-term culture of pluripotent stem cells, the medium consisting essentially of:

water, salts, amino acids, vitamins, a carbon source, insulin, an FGF, selenium, transferrin, and one of TGF-β and NODAL, each in an amount sufficient to support long-term pluripotent stem cell culture.

29. A method for culturing pluripotent stem cells, the method comprising the steps of:

placing pluripotent stem cells on a matrix; and

contacting the cells with an albumin-free medium that consists essentially of:

water, salts, amino acids, vitamins, a carbon source, insulin, an FGF, selenium, transferrin, and one of TGF-β and NODAL, each in an amount sufficient to support long-term pluripotent stem cell culture.

CLAIMS

The invention claimed is:

1. A defined, albumin-free medium comprising the following components: water, salts, amino acids, vitamins, a carbon source, insulin, FGF2, selenium, transferrin, and one of TGF-β and NODAL, each combined in an amount that supports proliferation of pluripotent stem cells.

2. A method for culturing pluripotent stem cells, the method comprising the steps of:
placing pluripotent stem cells on a matrix; and
contacting the cells with the defined, albumin-free medium of Claim 1.

3. The method of Claim 2, wherein the matrix comprises laminin.

4. The method of Claim 2, wherein the matrix comprises vitronectin.

5. The method of Claim 2, wherein the cells are contacted with the medium under hypoxic conditions.

6. The method of Claim 2, wherein the pluripotent stem cells are embryonic stem cells.

7. The method of Claim 2, wherein the pluripotent stem cells are induced pluripotent stem cells.

8. The method of Claim 2, wherein the pluripotent stem cells are human cells.

9. A method for cloning a pluripotent stem cell, the method comprising the step of:
plating pluripotent stem cells at cloning density in a defined, albumin-free medium comprising the following components: water, salts, amino acids, vitamins, a carbon source, insulin, FGF2, selenium, transferrin, and one of TGF-β and NODAL, each combined in an amount that supports pluripotent stem cell cloning.

10. The method of Claim 9, wherein the medium further comprises a ROCK inhibitor.

11. The method of Claim 10, wherein the ROCK inhibitor is selected from the group consisting of HA100 and Y27632.

12. The method of Claim 11, wherein the medium further comprises blebbistatin.

13. A method of cryopreserving pluripotent stem cells, the method comprising the step of:

freezing pluripotent stem cells in a defined, albumin-free medium comprising the following components: water, salts, amino acids, vitamins, a carbon source, insulin, FGF2, selenium, transferrin, and one of TGF-β and NODAL.

14. A method for deriving an induced pluripotent stem (iPS) cell under defined conditions, the method comprising the step of:

reprogramming a somatic cell in a defined, albumin-free medium comprising the following components: water, salts, amino acids, vitamins, a carbon source, insulin, FGF2, selenium, transferrin, and one of TGF-β and NODAL, each combined in an amount that supports somatic cell reprogramming to derive an iPS cell.

15. The method of Claim 14, wherein the reprogramming step comprises contacting the cell with TGF-β for 5-10 days.

16. The method of Claim 15, further comprising the steps of:

removing the TGF-β after 5-10 days; and

contacting the cells with a medium consisting essentially of:

water, salts, amino acids, vitamins, a carbon source, insulin, an FGF, selenium, and transferrin.

17. The method of Claim 14, wherein the reprogramming step comprises contacting the cell with hydrocortisone.

18. The method of Claim 14, wherein the reprogramming step comprises contacting the cell with butyrate.

19. The method of Claim 14, wherein the iPS cell is derived under xeno-free conditions.

20. The method of Claim 14, wherein the somatic cell is an adult somatic cell.

21. The method of Claim 14, wherein the reprogramming step comprises using a viral vector.

22. The method of Claim 14, wherein the reprogramming step comprises using an episomal vector.

23. A defined, albumin-free growth medium that supports long-term culture of pluripotent stem cells, the medium consisting essentially of the following components:

water, salts, amino acids, vitamins, a carbon source, insulin, an FGF, selenium, transferrin, and one of TGF-β and NODAL, each combined in an amount that supports long-term pluripotent stem cell culture.

24. A method for culturing pluripotent stem cells, the method comprising the steps of:

placing pluripotent stem cells on a matrix; and

contacting the cells with a defined, albumin-free medium that consists essentially of the following components:

water, salts, amino acids, vitamins, a carbon source, insulin, an FGF, selenium, transferrin, and one of TGF-β and NODAL, each combined in an amount that supports long-term pluripotent stem cell culture.